

AMENDMENTS TO THE CLAIMS

The claims have been amended as follows:

1. (Canceled)

2. (Currently Amended) A method according to claim [[1]] 7 in a frequency converter ~~in which~~ wherein the mains bridge semiconductor switches are gate turn-off components, such as IGBTs,

~~characterized in that~~ and the control of the switch to be conducting next is advanced by at least a time step T1, where

$$T1 = \frac{1}{2f} \times \left\{ 1 - \frac{1}{\pi} \times [\cos^{-1} \left(\frac{\sqrt{2} \times \pi \times f \times L \times i_{DC}}{U} - 1 \right)] \right\}$$

3. (Currently Amended) A method according to claim [[1]] 7 in a frequency converter ~~in which~~ wherein the semiconductor switches in the mains bridge are thyristors having a recovery time of (t_Q),

~~characterized in that~~ and the control of the thyristor to be conducting next is advanced by at least a time step $T2 + 0.5 \times t_Q$, where

$$T2 = \frac{1}{2f} \times \left\{ 1 - f \times t_Q - \frac{1}{\pi} \times \cos^{-1} \left[\frac{\sqrt{2} \times \pi \times f \times L \times i_{DC}}{U} + \cos(\pi \times (1 - f \times t_Q)) \right] \right\}$$

4. (Canceled)

5. (Currently Amended) A frequency converter according to claim [[4]] 8, ~~in which~~ wherein the mains bridge semiconductor switches are gate turn-off components, such as IGBTs, ~~characterized in that~~ and the control unit advances the control of the mains bridge semiconductor switch to be conducting next by at least time T1, where

$$T1 = \frac{1}{2f} \times \left\{ 1 - \frac{1}{\pi} \times [\cos^{-1} \left(\frac{\sqrt{2} \times \pi \times f \times L \times i_{DC}}{U} - 1 \right)] \right\}$$

6. (Currently Amended) A frequency converter according to claim [[4]] 8, ~~in which~~ wherein the mains bridge semiconductor switches are thyristors having a recovery time (t_Q), ~~characterized in that~~ and the control unit advances the control of the thyristor to be conducting next by at least time T2 + 0.5* t_Q, where

$$T2 = \frac{1}{2f} \times \left\{ 1 - f \times t_Q - \frac{1}{\pi} \times \cos^{-1} \left[\frac{\sqrt{2} \times \pi \times f \times L \times i_{DC}}{U} + \cos(\pi \times (1 - f \times t_Q)) \right] \right\}$$

7. (New) A method for controlling the mains bridge of a four-quadrant PWM frequency converter provided with a DC intermediate circuit when the power is flowing in the direction towards the supply network, comprising:

providing said frequency converter with an AC inductor to be connected to an alternating voltage source, a controlled mains bridge, a DC intermediate circuit and a controlled load bridge for feeding a variable-frequency alternating voltage into a load, and providing said mains bridge with controlled semiconductor switches and shunt diodes; and

controlling the mains bridge so that the controlled semiconductor switch in the upper branch of the phase having the highest supply voltage instantaneous value and the controlled semiconductor switch in the lower branch of the phase having the lowest supply voltage instantaneous value are conducting;

advancing the control of the mains bridge semiconductor switch to be conducting next by a time sufficient to cause the current of the conducting phase turned from negative to positive before commutation, the size of the time being determined by the size of the current in said mains bridge.

8. (New) A four-quadrant PWM frequency converter, comprising:

a mains bridge, said mains bridge being controlled by means of a control unit so the power flows in the direction towards the supply network;

an AC inductor connected to an alternating voltage source, a DC intermediate circuit and a controlled load bridge for feeding a variable-frequency alternating voltage into a load, said mains bridge being provided with controlled semiconductor switches and shunt diodes;

the mains bridge being controlled so that the controlled semiconductor switch in the upper branch of the phase having the highest supply voltage instantaneous value and the controlled semiconductor switch in the lower branch of the phase having the lowest supply voltage instantaneous value are conducting;

the control unit advancing the control of the semiconductor switch to be conducting next by a time sufficient to cause the current of the conducting phase to turn from negative to positive

just before commutation, the size of the time being determined by the size of the current in said
mains bridge.